Remarks/Arguments

Objections

Examiner objected to claim 12 for failing to state its dependency on claim 9. Claim 12 has been amended to express the dependency. It is therefore respectfully submitted that the basis for the objection has been removed and that the objection should be withdrawn.

35 U.S.C. §103

Claims 1-4, 7-8, and 18-19, stand rejected under 35 U.S.C. §103(a) as being unpatentable over King (U.S. Patent No. 7,289,775), in view of Demir (U.S. Pub. No. 2004/0248516).

Among the problems addressed by the present invention is the high transmission power consumption of power amplifiers which satisfy the linearity requirements of portable Time Division Duplex (TDD) systems. To address this problem, the present application discloses a TDD apparatus which amplifies a transmission signal based on a power level estimation of third order intermodulation products associated with the power amplifying means. The intermodulation products are represented by leakage signals going through switch to signal receiving elements during the transmitting mode.

It is respectfully asserted that neither King nor Demir, alone or in combination, disclose "control means for controlling said power amplifying means based on a power level estimation of third order intermodulation products associated with said power amplifying means, said intermodulation products being represented by leakage signals going through switch to signal receiving elements during the transmitting mode," as described in claim 1.

King teaches a transceiver which "has power control circuitry integrated therein. In particular, the power control circuitry receives a signal indicative of the transmit power level and adjusts the gain on a variable gain amplifier within the transceiver such that the output of the transceiver is at a level from which the power amplifier will amplify the signal to the desired transmit power." (King Abstract) However, as remarked by the examiner in the office action, King "does not mention the estimation of third order intermodulation products associated with the power amplifying." (Office Action, page 3)

Demir teaches a system operative to "compensate for performance degradation caused by inferior low-cost analog radio component tolerances of an analog radio." (Abstract) Demir discloses a wireless communication transmitter which "employs a control process to implement numerous digital signal processing (DSP) techniques to compensate for deficiencies of such analog components so that modern specifications may be relaxed. By monitoring a plurality of parameters associated with the analog radio, such as temperature, bias current or the like, enhanced phase and amplitude compensation, as well as many other radio frequency (RF) parameters may be implemented." (Abstract) The Office Action asserts that Demir "teaches the estimation of third order intermodulation products associated with the power amplifying (see fig. 5, power estimation unit (505), page 4, section [0050]). In this case, the estimation unit (505) which estimates the power using Y'2+QA2 and product of TPC (transmit power control) and The LUT (555) provides the RF characteristics information associated with the power amplifying, and RF parameter standards characteristics, such as intermodulation products, and that is obvious to the third order intermodulation products (see page 2, section [0036])." (Office Action, page 3)

However, the cited portion of Demir states: "Based on known gain and phase characteristics of the power amplifier 165, the digital pre-distortion compensation module 205 purposely distorts the phase and amplitude of the I and Q signal components, such that the power amplifier 165 generates a linear response, rather than a distorted response." (Demir, [0036]) Similarly, Demir later states "the amplitude characteristics of the land Q signal components are altered in accordance with the LUT 555 so as to compensate for distorted amplitude characteristics of the analog radio transmitter 150. (Demir, [0050]) Thus, Demir is distorting phase and amplitude of the signal, not controlling the power amplifying means. Furthermore, the adjustment is made based on "known gain and phase characteristics of the power amplifier," not on intermodulation products represented by leakage signals. Therefore, Demir, like King, fails to disclose "control means for controlling said power amplifying means based on a power level estimation of third order intermodulation products associated with said power amplifying means, said intermodulation products being represented by leakage signals going through switch to signal receiving elements during the transmitting mode," as described in claim 1.

In view of the above remarks and amendments to the claims, it is respectfully submitted that there is no 35 USC 112 enabling disclosure provided by King or Demir, alone or in combination, that makes the present invention as claimed in claim 1 unpatentable. It is also respectfully submitted that independent claim 9 is allowable for at least the same reasons as claim 1. Since dependent claims 2-8 and 10-19 are dependent

from allowable independent claims 1 and 9, it is submitted that they too are allowable for at least the same reasons that their respective independent claims are allowable. Thus, it is further respectfully submitted that this rejection has been satisfied and should be withdrawn.

Claims 5-6, stand rejected under 35 U.S.C. §103(a) as being unpatentable over King (U.S. Patent No. 7,289,775), in view of Demir (U.S. Pub. No. 2004/0248516), further in view of Haub (U.S. Pub. No. 2005/0026564).

Haub teaches a "method for reducing current drain in a communication device includes a first step of detecting interference including intermodulation and crossmodulation products. A next step includes determining a frequency offset of the interference with reference to the operating receiver band. A next step includes measuring a power level of the interference. A next step includes calculating a receiver linearity required to achieve a desired signal-to-interference ratio. A next step includes adjusting the receiver linearity in order to achieve the desired signal-to-interference ratio. Optionally, the receiver dynamic range can be adjusted to suit the reduced signal swing due to the reduced linearity. (Haub Abstract)

Haub, like King and Demir, also does not mention the estimation of third order intermodulation products associated with controlling a power amplification. Thus, it is respectfully submitted that Haub also fails to disclose "control means for controlling said power amplifying means based on a power level estimation of third order intermodulation products associated with said power amplifying means, said intermodulation products being represented by leakage signals going through switch to signal receiving elements during the transmitting mode," as described in claims 5 and 6.

In view of the above remarks and amendments to the claims, it is respectfully submitted that there is no 35 USC 112 enabling disclosure provided by King, Demir, or Haub, alone or in combination, that makes the present invention as claimed in claims 5-6 unpatentable. Furthermore, as claims 5-6 are dependent upon claim 1, which should be allowable for the reasons described above, it is respectfully asserted that they too should be allowable. Thus, it is further respectfully submitted that this rejection has been satisfied and should be withdrawn.

Claims 9-17, stand rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki (U.S. Patent No. 5,909,642), in view of King (U.S. Patent No. 7,289,775), in view of Demir (U.S. Pub. No. 2004/0248516).

Suzuki teaches that an "input unit enters two reference signals having respective different frequencies at a stage preceding a power amplifier. The reference signals are delivered through a predistortion circuit to a power amplifier, and supplied from a predetermined section of the power amplifier. The signals from the power amplifier contain a third-order intermodulation distortion component. Based on the signals from the power amplifier, an extracting unit extracts a frequency component having a frequency which is twice the difference between the frequencies of said two reference signals. A detecting unit detects the extracted frequency component thereby to output a DC voltage. Since the extracted frequency component is correlated to the third-order intermodulation distortion component, the DC voltage represents the magnitude of the third-order inter-modulation distortion component." (Suzuki Abstract) The Office Action asserts that Suzuki teaches a "method for controlling a transceiver apparatus (see fig. 1, radio communication device, col. 1, lines 16-21), comprising: detecting a power level of third order intermodulation products associated with a power amplifier of the transceiver apparatus (see col. 2, lines 28-57); and controlling the power amplifier responsive to the detection (see col. 2, lines 51-57)." (Office Action, page 2)

However, the cited portion of Suzuki describes "extracting means for extracting a frequency component related to the third-order intermodulation distortion, based on a signal supplied from a predetermined section of the power amplifier, detecting means for detecting the frequency component extracted by the extracting means thereby to output a DC voltage corresponding to the third-order intermodulation distortion..." Suzuki does not describe leakage signals going through a switch or their detection, as is described in the currently amended claim 9. Therefore, it is respectfully asserted that Suzuki, like King and Demir, fails to disclose "controlling said power amplifier responsive to said detection; wherein said detecting is performed during transmission; and wherein intermodulation products are represented by leakage signals going through a switch to signal receiving elements during said transmission" as described in currently amended claim 9.

In view of the above remarks and amendments to the claims, it is respectfully submitted that there is no 35 USC 112 enabling disclosure provided by King, Demir, or Suzuki, alone or in combination, that makes the present invention as claimed in claims 9-17

unpatentable. Furthermore, as claims 9-17 are dependent upon claim 8, which should be allowable for the reasons described above, it is respectfully asserted that they too should be allowable. Thus, it is further respectfully submitted that this rejection has been satisfied and should be withdrawn.

Having fully addressed the Examiner's rejections it is believed that, in view of the preceding amendments and remarks, this application stands in condition for allowance. Accordingly then, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicant's representative at (609) 734-6804, so that a mutually convenient date and time for a telephonic interview may be scheduled.

No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account 07-0832.

Respectfully submitted,

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